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EXAMINER	
MORRISON, JAY A	

ART UNIT	PAPER NUMBER
2168	

DATE MAILED: 10/03/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/711,931	CHOWDHURI, SUDIPTO R.	
	Examiner	Art Unit	
	Jay A. Morrison	2168	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *13 October 2004*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-70* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-70* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *13 October 2004* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date *8/10/05 & 8/11/05*.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

1. Claims 1-70 are pending.

Claim Rejections - 35 USC § 101

2. 35 U.S.C. 101 reads as follows:

> Whoever invents or discovers any new and useful process, machine, manufacture, or composition of matter, or any new and useful improvement thereof, may obtain a patent therefor, subject to the conditions and requirements of this title.

3. Claims 1-23,25-68,70 are rejected under 35 U.S.C. 101 because the claimed invention is directed to non-statutory subject matter.

Claims 1-23,25-68,70 are rejected under 35 U.S.C. 101 because the claimed invention is directed to non-statutory subject matter. The claims do not recite a practical application by producing a physical transformation or producing a useful, concrete, and tangible result. To perform a physical transformation, the claimed invention must transform an article or physical object into a different state or thing. Transformation of data is not a physical transformation. A useful, concrete, and tangible result must be either specifically recited in the claim or flow inherently therefrom. To be useful the claimed invention must establish a specific, substantial, and credible utility. To be concrete the claimed invention must be able to produce the same results given the same initial starting conditions. To be tangible the claimed invention must produce a practical application or real world result. In this case the claims fail to perform a physical transformation because the claims are directed to operating on data. The claims are

useful and concrete, but they fail to produce a tangible result because nothing is written to non-volatile media or, for example, returned to a user.

As per claims 26-47, these claims disclose a system but do not describe any hardware, which is required for a system claim to be statutory. Accordingly, these system claims are rejected as non-statutory for failing to disclose any hardware.

Claim Rejections - 35 USC § 112

4. The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

5. Claims 7-10,13,34-35,38,52,56,59 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Claim 7 recites the limitation "executing" in line 1. There is insufficient antecedent basis for this limitation in the claim. Claim 6 “provides for executing” whereas this claim refers to this previous step of executing as if it was concrete, which necessitates this rejection.

Claim 8 recites the limitation "executing" in line 1. There is insufficient antecedent basis for this limitation in the claim. Claim 6 “provides for executing” whereas this claim refers to this previous step of executing as if it was concrete, which necessitates this rejection.

Claim 9 recites the limitation "said parallel operator" in line 1. There is insufficient antecedent basis for this limitation in the claim.

Claim 34 recites the limitation "said parallel operator" in line 1. There is insufficient antecedent basis for this limitation in the claim.

Claim 52 recites the limitation "said parallel operator" in line 3. There is insufficient antecedent basis for this limitation in the claim.

The term "efficiently partition" in claims 10,35 and 56 is a relative term which renders the claim indefinite. The term "efficiently partition" is not defined by the claim, the specification does not provide a standard for ascertaining the requisite degree, and one of ordinary skill in the art would not be reasonably apprised of the scope of the invention.

The term "less favorable" in claims 13,38 and 59 is a relative term which renders the claim indefinite. The term "less favorable" is not defined by the claim, the specification does not provide a standard for ascertaining the requisite degree, and one of ordinary skill in the art would not be reasonably appraised of the scope of the invention.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the

invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

6. Claim 1-70 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ghosh et al. ('Ghosh' hereinafter) (Patent Number 7,051,034) in view of Bestgen et al. ('Bestgen' hereinafter) (Patent Number 6,754,652).

As per claim 1, Ghosh teaches

In a database system, a method for parallel optimization of a query, the method comprising: (see abstract and background)

generating a plurality of parallel plans (restartable sub-trees, column 3, lines 10-20; note: the various permutations in which query can be executed depending upon the order of the execution of the sub-trees constitutes a plurality of parallel plans)

for obtaining data requested by the query, ('for' indicates intended use; Minton v. Nat 'l Ass 'n of Securities Dealers, Inc., 336 F.3d 1373, 1381, 67 USPQ2d 1614, 1620 (Fed. Cir. 2003) "whereby clause in a method claim is not given weight when it simply expresses the intended result of a process step positively recited." Examples of claim language, although not exhaustive, that may raise a question as to the limiting effect of the language in a claim are: (A) "adapted to" or "adapted for " clauses; (B) "wherein" clauses; and (C) "whereby" clauses. Therefore intended use limitations are not required to be taught, see MPEP § 2106 Section II(C), MPEP 2111.04 [R-3])

the parallel plans including parallel operators (parallel, column 14, lines 53-57)

for executing portions of the query in parallel; ('for' indicates intended use; Minton v. Nat 'l Ass 'n of Securities Dealers, Inc., 336 F.3d 1373, 1381, 67 USPQ2d 1614, 1620 (Fed. Cir. 2003) "whereby clause in a method claim is not given weight when it simply expresses the intended result of a process step positively recited." Examples of claim language, although not exhaustive, that may raise a question as to the limiting effect of the language in a claim are: (A) "adapted to" or "adapted for " clauses; (B) "wherein" clauses; and (C) "whereby" clauses. Therefore intended use limitations are not required to be taught, see MPEP § 2106 Section II(C), MPEP 2111.04 [R-3])

adjusting parallel operators of each parallel plan if necessary based on resources available for executing the query; ('if' denotes an optionally recited limitation and optionally recited limitations are not guaranteed to take place and are therefore not required to be taught, see MPEP § 2106 Section II(C))

creating a schedule for each parallel plan indicating a sequence for execution of operators of each parallel plan; (scheduler routine, column 5, lines 25-34)

determining execution cost of each parallel plan based on its schedule; (costs, column 3, lines 20-32)

parallel plan (parallel, column 4, lines 44-54)

for obtaining data requested by the query. ('for' indicates intended use; Minton v. Nat 'l Ass 'n of Securities Dealers, Inc., 336 F.3d 1373, 1381, 67 USPQ2d 1614, 1620 (Fed. Cir. 2003) "whereby clause in a method claim is not given weight when it simply expresses the intended result of a process step positively recited." Examples of claim language, although not exhaustive, that may raise a question as to the limiting effect of

the language in a claim are: (A) "adapted to" or "adapted for " clauses; (B) "wherein" clauses; and (C) "whereby" clauses. Therefore intended use limitations are not required to be taught, see MPEP § 2106 Section II(C), MPEP 2111.04 [R-3])

Ghosh does not explicitly indicate "and selecting a particular ... plan having lowest execution cost".

However, Bestgen discloses "and selecting a particular ... plan having lowest execution cost" (selects plan, column 16, lines 38-46).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to combine Ghosh and Bestgen because using the steps of "and selecting a particular ... plan having lowest execution cost" would have given those skilled in the art the tools to improve the invention by simulating the condition under which the query will be executed. This gives the user the advantage of making a decision concerning which query will be the most efficient.

As per claim 2, Ghosh teaches

the query comprises a Structured Query Language (SQL) expression. (column 3, lines 38-42)

As per claim 3, Ghosh teaches

said generating step includes generating an operator tree for each parallel plan based on the query. (column 3, lines 44-53)

As per claim 4, Ghosh teaches

said step of generating an operator tree includes generating nodes of the operator tree as iterators (column 3, lines 54-61)

for applying predefined behavior to data. ('for' indicates intended use; Minton v. Nat 'l Ass 'n of Securities Dealers, Inc., 336 F.3d 1373, 1381, 67 USPQ2d 1614, 1620 (Fed. Cir. 2003) "whereby clause in a method claim is not given weight when it simply expresses the intended result of a process step positively recited." Examples of claim language, although not exhaustive, that may raise a question as to the limiting effect of the language in a claim are: (A) "adapted to" or "adapted for " clauses; (B) "wherein" clauses; and (C) "whereby" clauses. Therefore intended use limitations are not required to be taught, see MPEP § 2106 Section II(C), MPEP 2111.04 [R-3])

As per claim 5, Ghosh teaches

said step of generating an operator tree includes inserting a parallel operator in the operator tree. (column 4, lines 44-53)

As per claim 6, Ghosh teaches

said step of generating an operator tree includes dividing a query operation into sub-tasks and said parallel operator provides for executing said sub-tasks in parallel. (column 3, lines 44-53)

As per claim 7, Ghosh teaches

said step of executing said sub-tasks in parallel includes executing said sub-tasks in parallel across a plurality of storage units. (column 5, lines 35-43; column 8, lines 47-50)

As per claim 8, Ghosh teaches

said step of executing said sub-tasks in parallel includes executing said sub-tasks in parallel across a plurality of CPUs. (column 5, lines 35-43; column 8, lines 47-50)

As per claim 9, Ghosh teaches

said parallel operator provides for pipelining of intermediate results from a first set of operators to a second set of operators. (column 5, lines 14-25)

As per claim 10, Ghosh teaches

said generating step includes generating a parallel plan using a partitioning property so as to efficiently partition data among operators of the parallel plan. (column 3, lines 44-53)

As per claim 11, Ghosh teaches

said generating step includes generating a cost vector for each parallel plan. (column 3, lines 20-33)

As per claim 12, Ghosh teaches

said cost vector includes as components a selected one or more of work done by a processor in a given time, execution time of an operator in the parallel plan, and resource usage of an operator in the parallel plan for a certain time period. (column 3, lines 20-33)

As per claim 13, Ghosh teaches

said generating step further comprises: pruning a first parallel plan having a cost vector less favorable in each vector dimension than a second parallel plan. (column 3, lines 20-33)

As per claim 14, Ghosh teaches

said generating step includes generating a plurality of parallel plans based at least in part on partitioning and multi-dimensional costing. (column 3, lines 20-33)

As per claim 15, Ghosh teaches

said adjusting step includes adjusting a parallel plan for available worker processes at compile time. (column 3, lines 54-63)

As per claim 16, Ghosh teaches

the parallel plan comprises an operator tree and an adjustment is made to at least some parallel operators of the operator tree if the operator tree exceeds maximum

configured worker processes. ('if' denotes an optionally recited limitation and optionally recited limitations are not guaranteed to take place and are therefore not required to be taught, see MPEP § 2106 Section II(C))

As per claim 17, Ghosh teaches

said step of adjusting parallel operators of each parallel plan if necessary based on resources available for executing the query includes adjusting parallel operators based on available memory resources. ('if' denotes an optionally recited limitation and optionally recited limitations are not guaranteed to take place and are therefore not required to be taught, see MPEP § 2106 Section II(C))

As per claim 18, Ghosh teaches

said creating step includes separating a resource intensive operator into a plurality of operators. (column 3, lines 44-63)

As per claim 19, Ghosh teaches

said creating step includes identifying pipelines in each parallel plan. (column 5, lines 35-56)

As per claim 20, Ghosh teaches

said creating step includes constructing a pipeline dependency tree based on dependencies among operators of each parallel plan. (column 5, lines 35-56)

As per claim 21, Ghosh teaches

said creating step includes determining order of execution of pipelines based on the pipeline dependency tree and available resources. (column 3, lines 44-63)

As per claim 22, Ghosh teaches

if resource usage of a particular pipeline is greater than resources available for the particular pipeline, splitting the particular pipeline into a plurality of pipelines. ('if' denotes an optionally recited limitation and optionally recited limitations are not guaranteed to take place and are therefore not required to be taught, see MPEP § 2106 Section II(C))

As per claim 23, Ghosh teaches

said step of splitting the particular pipeline includes adding operators (column 3, lines 44-63)

for materializing the particular pipeline into a plurality of pipelines at intervals such that resource usage is evenly distributed over the plurality of pipelines. ('for' indicates intended use; Minton v. Nat 'l Ass 'n of Securities Dealers, Inc., 336 F.3d 1373, 1381, 67 USPQ2d 1614, 1620 (Fed. Cir. 2003) "whereby clause in a method claim is not given weight when it simply expresses the intended result of a process step positively recited." Examples of claim language, although not exhaustive, that may raise a question as to the limiting effect of the language in a claim are: (A) "adapted to" or

"adapted for " clauses; (B) "wherein" clauses; and (C) "whereby" clauses. Therefore intended use limitations are not required to be taught, see MPEP § 2106 Section II(C), MPEP 2111.04 [R-3])

As per claim 24, Ghosh teaches

A computer-readable medium having processor-executable instructions for performing the method of claim 1. (column 9, lines 5-20)

As per claim 25, Ghosh teaches

A downloadable set of processor-executable instructions for performing the method of claim 1. (column 9, lines 5-20)

As per claims 26-40,

These claims are rejected on grounds corresponding to the arguments given above for rejected claims 1-15 and are similarly rejected.

As per claim 41, Ghosh teaches

a parallel plan comprises an operator tree and the parallel scheduler adjusts at least some parallel operators of the operator tree based on available threads. (column 6, lines 18-28)

As per claims 42-47,

These claims are rejected on grounds corresponding to the arguments given above for rejected claims 18-23 and are similarly rejected.

As per claim 48, Ghosh teaches

A method for parallel optimization of a query requesting data from a database, the method comprising: (see abstract and background)

creating a plurality of operator trees for executing the query, the operator trees providing for execution of portions of the query in parallel; (sub-query, column 3, lines 44-53)

adjusting the portions of the query to be executed in parallel based on memory resources available for executing the query; (latency costs, column 3, lines 20-33)

generating a schedule for execution of each operator tree; (scheduler routine, column 5, lines 25-34)

the operator tree (sub-query, column 3, lines 44-53).

Ghosh does not explicitly indicate "and selecting ... having lowest execution cost based on its schedule for executing the query".

However, Bestgen discloses "and selecting ... having lowest execution cost based on its schedule for executing the query" (selects plan, column 16, lines 38-46).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to combine Ghosh and Bestgen because using the steps of "and selecting ... having lowest execution cost based on its schedule for executing the query" would have given those skilled in the art the tools to improve the invention by simulating

the condition under which the query will be executed. This gives the user the advantage of making a decision concerning which query will be the most efficient.

As per claim 49, Ghosh teaches

the query comprises a Structured Query Language (SQL) expression. (column 3, lines 38-42)

As per claim 50, Ghosh teaches

said creating step includes creating an operator tree including parallel operators (column 4, lines 44-53)

for execution of portions of the query in parallel. ('for' indicates intended use; Minton v. Nat 'l Ass 'n of Securities Dealers, Inc., 336 F.3d 1373, 1381, 67 USPQ2d 1614, 1620 (Fed. Cir. 2003) "whereby clause in a method claim is not given weight when it simply expresses the intended result of a process step positively recited." Examples of claim language, although not exhaustive, that may raise a question as to the limiting effect of the language in a claim are: (A) "adapted to" or "adapted for " clauses; (B) "wherein" clauses; and (C) "whereby" clauses. Therefore intended use limitations are not required to be taught, see MPEP § 2106 Section II(C), MPEP 2111.04 [R-3])

As per claim 51, Ghosh teaches

said parallel operators comprise iterators (column 3, lines 54-61)

for applying predefined behavior to data. ('for' indicates intended use; Minton v. Nat 'l Ass 'n of Securities Dealers, Inc., 336 F.3d 1373, 1381, 67 USPQ2d 1614, 1620 (Fed. Cir. 2003) "whereby clause in a method claim is not given weight when it simply expresses the intended result of a process step positively recited." Examples of claim language, although not exhaustive, that may raise a question as to the limiting effect of the language in a claim are: (A) "adapted to" or "adapted for " clauses; (B) "wherein" clauses; and (C) "whereby" clauses. Therefore intended use limitations are not required to be taught, see MPEP § 2106 Section II(C), MPEP 2111.04 [R-3])

As per claim 52, Ghosh teaches

said step of creating an operator tree includes creating operators for tasks to be performed in executing the query and said parallel operator provides for executing said tasks in parallel. (column 4, lines 44-53)

As per claim 53, Ghosh teaches

a parallel operator executes in parallel across a plurality of storage units. (column 5, lines 35-43; column 8, lines 47-50)

As per claim 54, Ghosh teaches

a parallel operator executes in parallel across a plurality of CPUs. (column 5, lines 35-43; column 8, lines 47-50)

As per claim 55, Ghosh teaches

a parallel operator provides for pipelining of intermediate results from a first set of operators to a second set of operators. (column 5, lines 35-56)

As per claim 56, Ghosh teaches

said creating step includes creating an operator tree using a partitioning property so as to efficiently partition data among operators. (column 3, lines 44-63)

As per claim 57, Ghosh teaches

said creating step includes generating a cost vector for each operator tree. (column 3, lines 20-33)

As per claim 58, Ghosh teaches

said cost vector includes as components a selected one or more of work done by a processor in a given time, execution time of an operator, and resource usage of an operator for a certain time period. (column 3, lines 20-33)

As per claim 59, Ghosh teaches

said creating step further comprises: pruning a first operator tree having a cost vector less favorable in each vector dimension than a second operator tree. (column 3, lines 20-33)

As per claim 60, Ghosh teaches

said creating step includes creating a plurality of operator trees based at least in part on partitioning and multi-dimensional costing. (column 3, lines 20-33)

As per claim 61, Ghosh teaches

said adjusting step includes adjusting an operator tree for available worker processes at compile time. (column 5, lines 35-55)

As per claim 62, Ghosh teaches

said operator tree includes parallel operators for executing portions of the query in parallel (column 4, lines 35-44)

and said adjusting step includes adjusting said parallel operators if necessary based on available memory resources. ('if' denotes an optionally recited limitation and optionally recited limitations are not guaranteed to take place and are therefore not required to be taught, see MPEP § 2106 Section II(C))

As per claim 63, Ghosh teaches

said adjusting step includes separating a resource intensive operator into a plurality of operators. (column 3, lines 44-63)

As per claim 64, Ghosh teaches

said generating step includes identifying pipelines in each operator tree. (column 5, lines 35-56)

As per claim 65, Ghosh teaches

said generating step includes constructing a pipeline dependency tree based on dependencies among operators of each operator tree. (column 5, lines 35-56)

As per claim 66, Ghosh teaches

said creating step includes determining order of execution of pipelines based on the pipeline dependency tree and available resources. (column 5, lines 35-56)

As per claim 67, Ghosh teaches

if resource usage of a particular pipeline is greater than resources available for the particular pipeline, splitting the particular pipeline into a plurality of pipelines. ('if' denotes an optionally recited limitation and optionally recited limitations are not guaranteed to take place and are therefore not required to be taught, see MPEP § 2106 Section II(C))

As per claim 68, Ghosh teaches

said step of splitting the particular pipeline includes adding operators for materializing the particular pipeline into a plurality of pipelines at intervals such that

resource usage is evenly distributed over the plurality of pipelines. (column 3, lines 44-63)

As per claim 69, Ghosh teaches

A computer-readable medium having processor-executable instructions for performing the method of claim 48. (column 9, lines 5-20)

As per claim 70, Ghosh teaches

A downloadable set of processor-executable instructions for performing the method of claim 48. (column 9, lines 5-20)

Conclusion

7. The prior art made of record, listed on form PTO-892, and not relied upon is considered pertinent to applicant's disclosure.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Jay A. Morrison whose telephone number is (571) 272-7112. The examiner can normally be reached on M-F 8-4:30.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Tim Vo can be reached on (571) 272-3642. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

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